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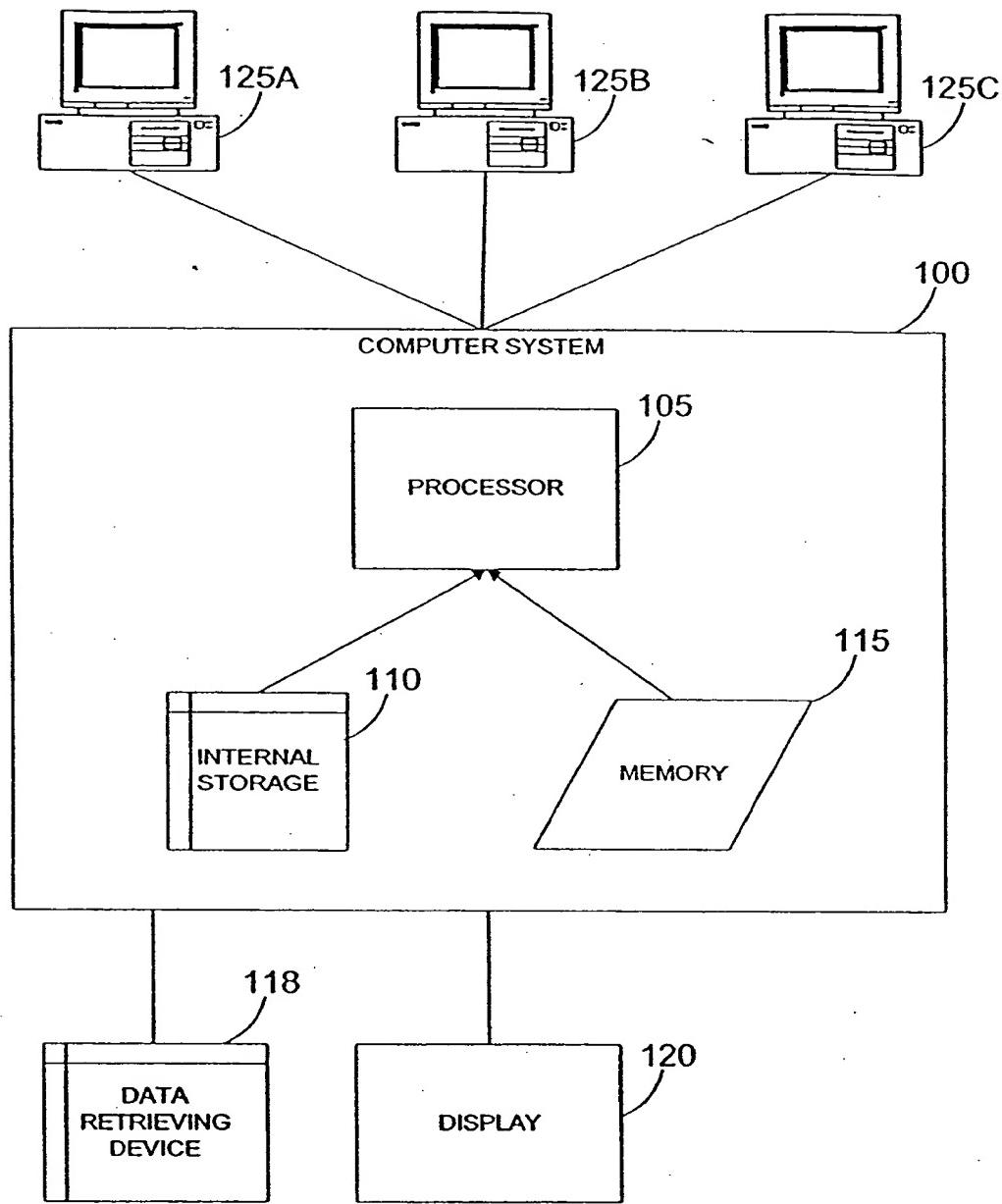


FIGURE 1

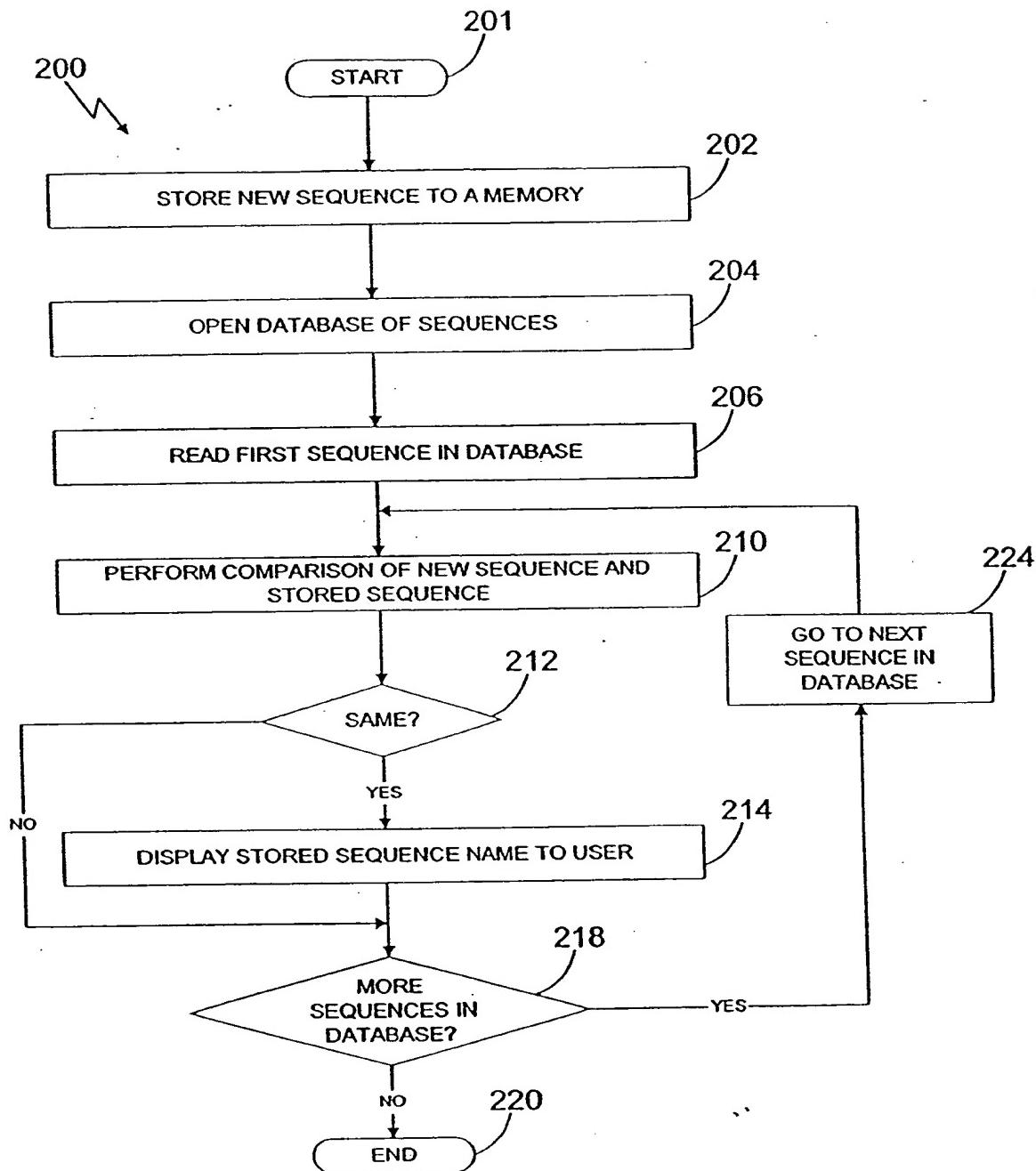


FIGURE 2

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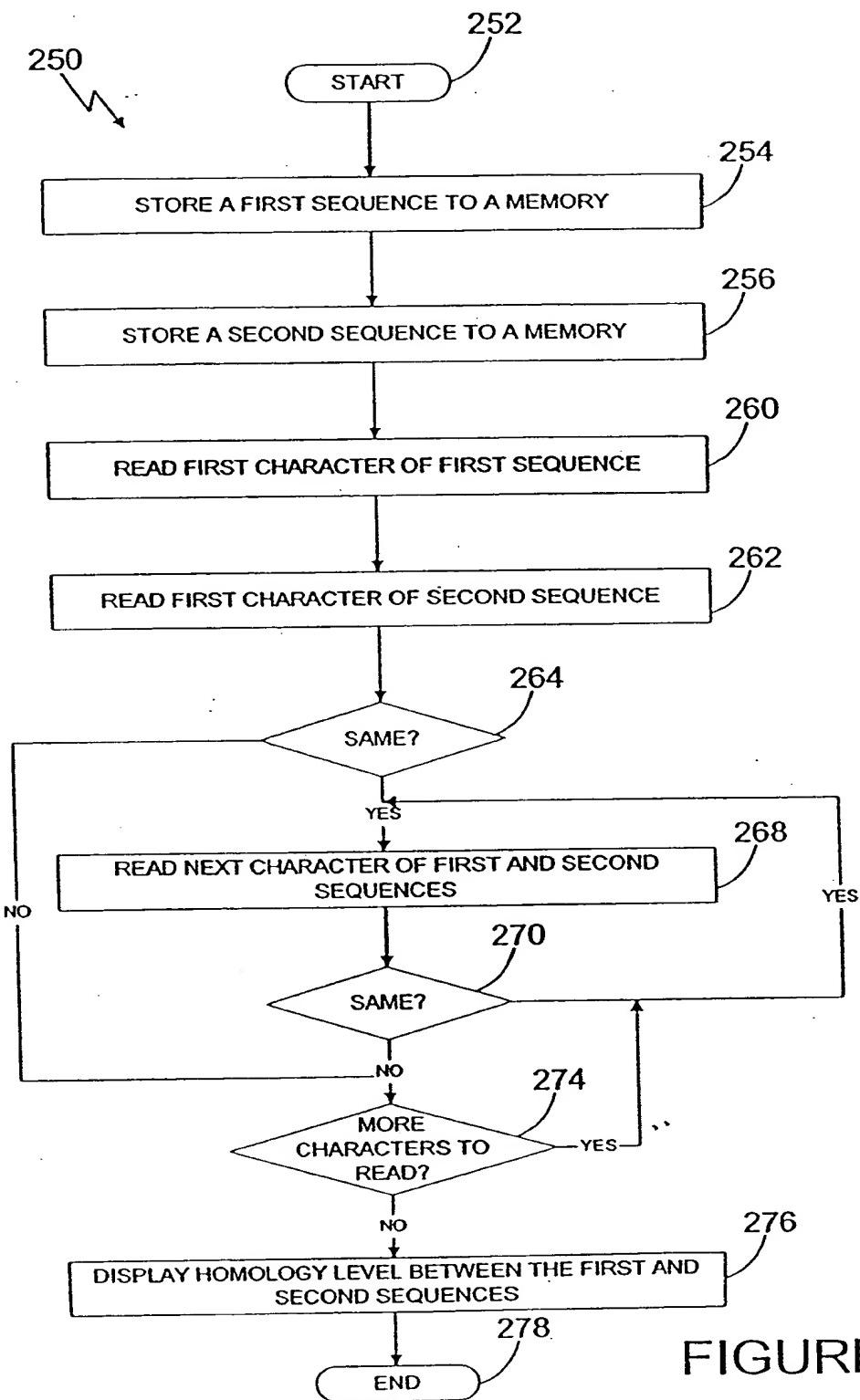


FIGURE 3

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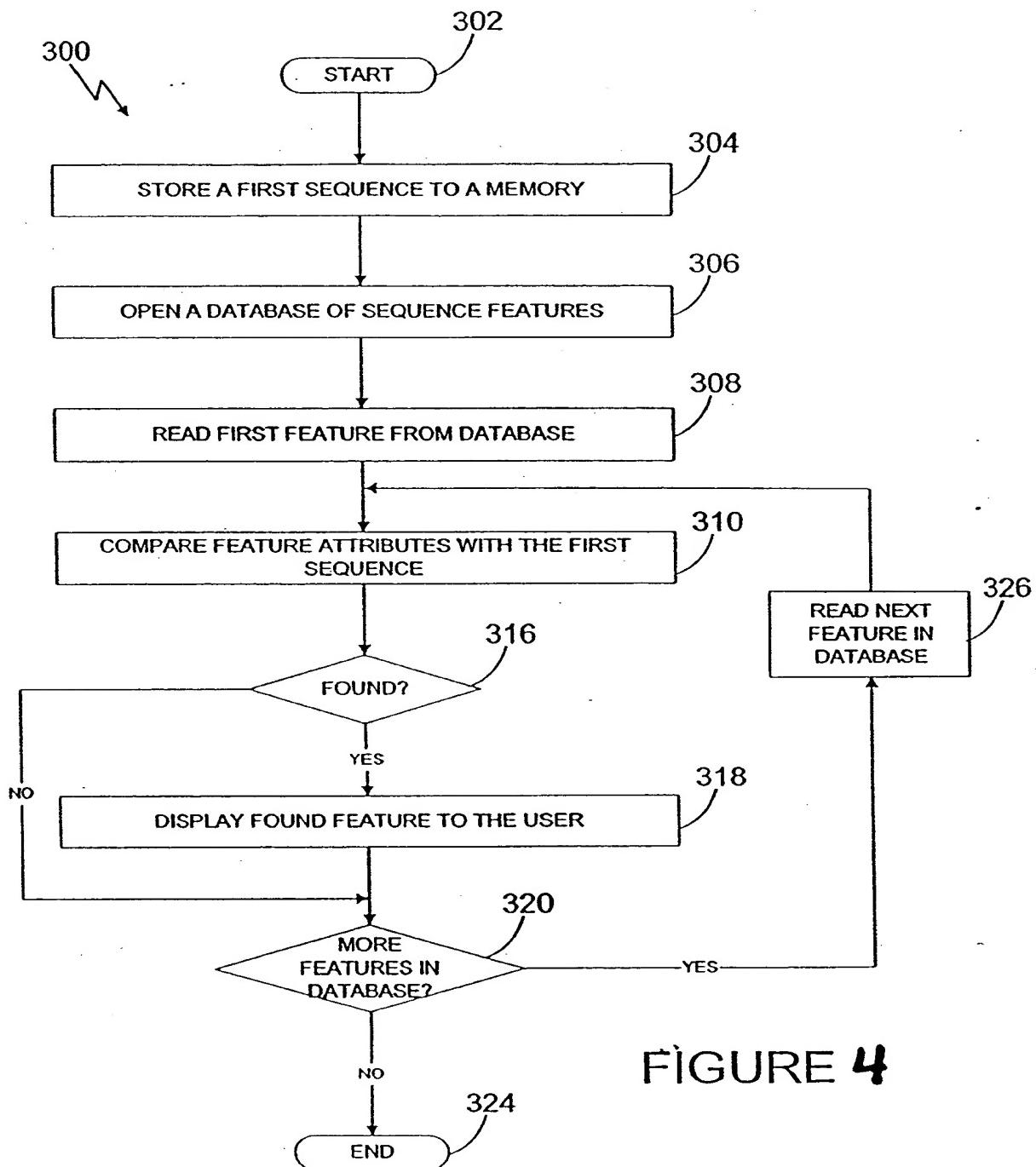


FIGURE 4

112 250 200 250

Thermococcus GUSL5 Amidase

1 ATG ACC GGC ATC GAA TGG AAC CAC GAG ACC TTT TCT AAG TTC GCC TAC CTG GGC GAC CCG 60
1 Met Thr Gly Ile Glu Trp Asn His Glu Thr Phe Ser Lys Ala Tyr Leu Glu Asp Pro 20

61 AGG ATA CGG GGA AAC TTA ATC GCG TAC ACC CTG ACG AAG GCC AAC ATG AAG GAC AAC AAG
120
21 Arg Ile Arg Gly Asn Leu Ile Ala Tyr Thr Leu Thr Lys Ala Asn Met Lys Asp Asn Lys 40

121 TAC GAG AGC ACG GTT GTT GAA GAC CTT GAA ACG GGC TCA AGG CGC TTC ATC GAG AAC 180
41 Tyr Glu Ser Thr Val Val Val Glu Thr Gly Ser Arg Arg Phe Ile Glu Asn 60

181 GCC TCA ATG CCG AGG ATT TAG CCA GAC GGC AGA AAG CTC GCC TTC ACC TGC TTT AAC GAG 240
61 Ala Ser Met Pro Arg Ile Ser Pro Asp Gly Arg Lys Leu Ala Phe Thr Cys Phe Asn Glu 80

241 GAG AAG AAG GAG ACC GAG ATA TGG GTG GCC GAT ATC CAG ACC ACC CTG AGC GCC AAG AAA GTC
100
81 Glu Lys Lys Glu Thr Glu Ile Trp Val Ala Asp Ile Glu Thr Leu Ser Ala Lys Lys Val 100

FIG. 5A

TCGCGTGTGAGCTGTTGAGAAGCTGATGAGGAGGAAAC

301 CTC TCA ACT AAA AAC GTC CGC TCG ATG CAG TGG AAC GAC GAT TCA AGG AGA CTC TTA GTT 360
101 Leu Ser Thr Lys Asn Val Arg Ser Met Gln Trp Asn Asp Asp Ser Arg Arg Leu Leu Val 120

361 GTC GGC TTC AAG AGG GAC GAT GAG GAC GTC TTC GTC TTT GAC GAC GTC CCG GTC TGG 420
121 Val Gly Phe Lys Arg Asp Asp Glu Asp Phe Val Phe Asp Asp Asp Val Pro Val Trp 140

421 TTC GAC AAT ATG GGA TTC TTT GAT GGA GAG AAG ACG ACG ACG TTC TGG GTT CTT GAC ACT GAG 480
141 Phe Asp Asn Met Gly Phe Asp Gly Glu Lys Thr Thr Phe Trp Val Leu Asp Thr Glu 160

481 GCC GAG GAG ATA ATC GAG CAG TTC GAG AAG CCG AGG TTT TCG AGT GGC CCT TGG CAC GGC 540
161 Ala Glu Glu Ile Ile Glu Gln Phe Glu Lys Pro Arg Phe Ser Ser Gly Leu Trp His Glu 180

541 GAT GCG ATA GTT GTG AAC GTC CCG CAC CGC GAG GGG AGC AAG CCT GCC CTG TTC AAG TTC 600
181 Asp Ala Ile Val Asn Val Pro His Arg Glu Gly Ser Lys Pro Ala Leu Phe Lys Phe 200

601 TAC GAC ATA GTC CTA TGG AAG GAC GGG GAG GAA GAG AAG CTC TTC GAG AGG GTC TCC TTC 660
201 Tyr Asp Ile Val Leu Trp Lys Asp Gly Glu Glu Glu Lys Leu Phe Glu Arg Val Ser Phe 220

661 GAG GCG GTT GAC TCC GAC GGA AAG AGA ATA CTC CTG AGG GGC AAG AAA AAA AAG CGG TTC
720
221 Glu Ala Val Asp Ser Asp Gly Lys Arg Ile Leu Leu Arg Gly Lys Lys Arg Phe 240

FIG. 5B

721 ATC AGC GAG CAC GAC TGG CTG TAC CTC TGG GAC GGC GAG CTT AAA CCG ATC TAC GAG GGC 780
241 Ile Ser Glu His Asp Trp Leu Tyr Leu Trp Asp Gly Glu Leu Lys Pro Ile Tyr Glu Gly 260

781 CCG CTC GAC GTC TGG GAA GCC AAG CTC ACG GAA GGA AAG GTC TAC TTC CTC ACT CCA GAT 840
261 Pro Leu Asp Val Trp Glu Ala Lys Leu Thr Glu Gly Lys Val Tyr Phe Leu Thr Pro Asp 280

841 CGG GGC AGG GTA AAC CTC TGG CTC TGG GAC GGC GGG AAG GCC GAG CGT GTT ACC GGC GAC 900
281 Ala Gly Arg Val Asn Leu Trp Leu Trp Asp Gly Lys Ala Glu Arg Val Val Thr Gly Asp 300

901 CAC TGG ATT TAC GGG CTT GAC GTC AGC GAT GGC AAA GCA TTG CTC CTC ATC ATG ACC GCC 960
301 His Trp Ile Tyr Gly Leu Asp Val Ser Asp Gly Lys Ala Leu Leu Ile Met Thr Ala 320

961 ACG AGG ATA GGC GAG CTC TAC CTC TAC GAC GGC GAG CTG AAA CAG GTC ACC GAA TAC AAC
1020

321 Thr Arg Ile Gly Glu Leu Tyr Asp Gly Glu Leu Lys Glu Val Thr Glu Tyr Asn 340

1080

1021 GGG CCG ATA TTC AGG AAG CTC AAG ACC TTC GAG CCG AGG CAC TTC CGC TTC AAG AGC AAA

341 Gly Pro Ile Phe Arg Lys Leu Lys Thr Phe Glu Pro Arg His Phe Arg Phe Lys Ser Lys 360

1140

1081 GAC CTC GAG ATA GAC GGC TGG TAC CTC AGG CCG GAG GTT AAA GAG GAG AAG GCC CCC GTG

361 Asp Leu Glu Ile Asp Gly Trp Tyr Leu Arg Pro Glu Val Lys Glu Glu Lys Ala Pro Val 380

FIG. 5C

1141 ATA GTC TTC GTC CAC GGC GGG CCG AAG GGC ATG TAC GGA CAC CGC TTC GTC TAC GAG ATG
1200
381 Ile Val Phe Val His Gly Gly Pro Lys Gly Met Tyr Gly His Arg Phe Val Tyr Glu Met 400

1201 CAG CTG ATG GCG AGC AAG GGC TAC TAC GTC GTC TTC GTG AAC CCG CGC CGC AGC GAC GGC
1260
401 Gln Leu Met Ala Ser Lys Gly Tyr Tyr Val Val Phe Val Asn Pro Arg Gly Ser Asp Gly 420

1261 TAT AGC GAA GAC TTC GCG CTC CGC GTC CTC GAG AGG ACT GGC TTG GAG GAC TTT GAG GAC
1320
421 Tyr Ser Glu Asp Phe Ala Leu Arg Val Leu Glu Arg Thr Gly Leu Glu Asp Phe Glu Asp 440

1321 ATA ATG AAC GGC ATC GAG GAG TTC TTC AAG CTC GAA CCG CAG GCC GAC AGG GAG CGC GTC
1380
441 Ile Met Asn Gly Ile Glu Glu Phe Phe Lys Leu Glu Pro Glu Ala Asp Arg Glu Arg Val 460

1381 GGA ATA ACG GGC ATA AGC TAC GGC GGC TTC ATG ACC AAC TGG GCC TTG ACT CAG AGC GAC
1440
461 Gly Ile Thr Gly Ile Ser Tyr Gly Gly Phe Met Thr Asn Trp Ala Leu Thr Glu Ser Asp 480

1441 CTC TTC AAG GCA GGA ATA AGC GAG AAC GGC ATA AGC TAC TGG CTC ACC AGC TAC GCC TTG
1500
481 Leu Phe Lys Ala Gly Ile Ser Glu Asn Gly Ile Ser Tyr Trp Leu Thr Ser Tyr Ala Phe 500

FIG. 5D

TCG GAC ATA GGG CTC TGG TAC GAC GTC GAG GTC ATC GGG CCA AAT CCG TTA GAG AAC GAG

1560
501 Ser Asp Ile Gly Leu Trp Tyr Asp Val Glu Val Ile Gly Pro Asn Pro Leu Glu Asn Glu 520

1561 AAC TTC AGG AAG CTC AGC CGC CTG TTCTAC GCT CAG AAC GTG AAG GCG CCC ATA CTC CTA
1620
521 Asn Phe Arg Lys Leu Ser Pro Leu Phe Tyr Ala Glu Asn Val Lys Ala Pro Ile Leu Leu 540

1621 ATC CAC TCG CTT GAG GAC TAC CGC TGT CCG CTC GAC CAG AGC CTT ATG TTC TAC AAC GTG
1680
541 Ile His Ser Leu Glu Asp Tyr Arg Cys Pro Leu Asp Gin Ser Leu Met Phe Tyr Asn Val 560

1681 CTC AAG GAC ATG GGC AAG GAA GCC TAC ATA GCG ATA TTC AAG CGC GCC CAC GGC CAC
1740
561 Leu Lys Asp Met Gly Lys Glu Ala Tyr Ile Ala Ile Phe Lys Arg Gly Ala His Gly His 580

1741 AGC GTC CGC GGA AGC AGG CAC AGG CCG AAG CGC TAC AGG CTC TTC ATA GAG TTC TTC
1800
581 Ser Val Arg Gly Ser Pro Arg His Arg Pro Lys Arg Tyr Arg Leu Phe Ile Glu Phe Phe 600

1801 GAG CGC AAG CTC AAG AAC TAC GAG GAG GGC TTT GAG GTA GAG AAG ATA CTC AAG GGG AAT
1860
601 Glu Arg Lys Leu Lys Tyr Glu Glu Gly Phe Glu Val Glu Lys Ile Leu Lys Gly Asn 620

1861 GGG AAC TGA 1869
621 Gly Asn End 623

FIG. 5E

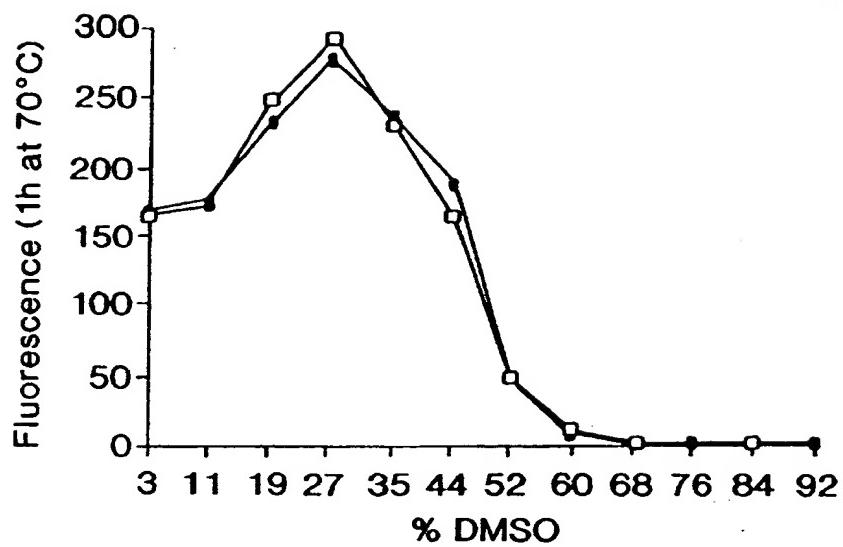


FIG. 6

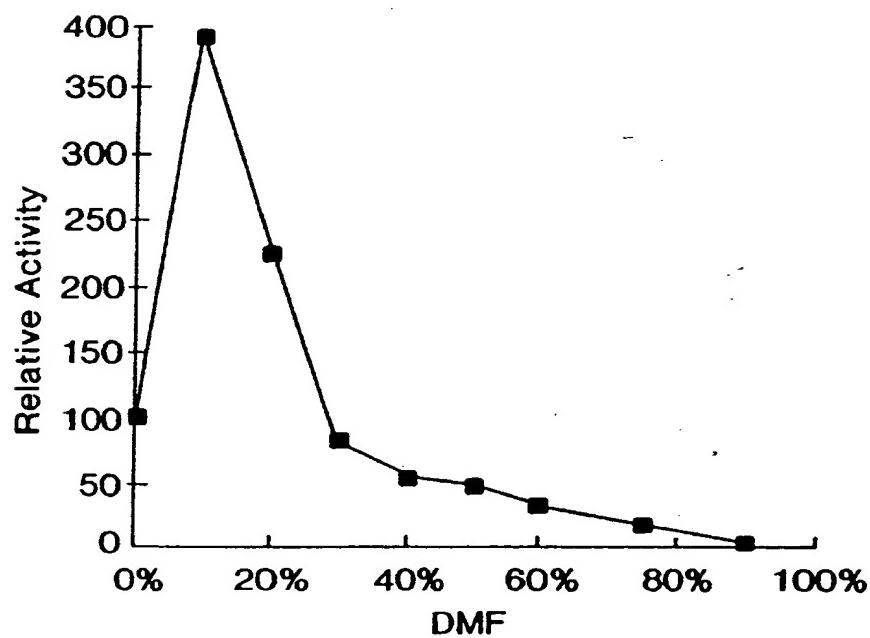


FIG. 7